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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/280,268	03/29/1999	ANNE E. MILLER	42390.P6147	5522

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EXAMINER

DEO, DUY VU

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 10/10/2002

22

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/280,268

Applicant(s)

MILLER ET AL.

Examiner

DuyVu n Deo

Art Unit

1765

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 June 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5, 7-9, 12-14 and 26-29 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-9, 12-14, 26-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-5, 7-9, 12-14, 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farkas et al. (US 5,773,364), Farkas (Oxidation and Etching of the W in CMP Slurries), Grumbine et al. (US 6,083,419), and Brusie et al. (Electrochemical Approach to Au and Cu CMP Process Development).

Farkas describes a slurry comprising: an aqueous suspension of one or more abrasive species (claimed liquid and abrasive); ammonium cerium nitrate as etcher/oxidizer species, which would produce cerium ions; a pH increasing substance such as ammonium hydroxide (col. 3, line 21-25; line 64-col. 4, line 5, line 27-29, line 47).

Unlike claimed invention, Farkas doesn't describe the slurry including glycine that increases pH value to 1.5-3.0. Brusie teaches a slurry for metal material wherein glycine, such as 1 or 2% is added in the slurry (pg 179, 180). It would have been obvious for one skill in the art to add glycine because Brusie shows that glycine increases the dissolution rate of copper metal in the slurry. Adding glycine would also change the pH of the slurry. The amount of glycine shows in the examples of Brusie would be enough to increase the pH of the slurry above 1.5. Since the pH of the slurry for metal is known to one skill in the art to be below 4 (please see

Art Unit: 1765

Skrovan and Beyer references cited below), the amount of glycine, to be added, would be obvious to one skill in the art to be determined through test runs in order to achieve an optimum pH such as one lower than 4 to polish the metal with a reasonable expectation of success.

Unlike claimed invention, Farkas doesn't describe the cerium ions being in a quantity equal to the inclusion of at least 0.02 molar ammonium cerium nitrate in the liquid. However, Farkas shows in his article of "Oxidation and Etching of the Tungsten in CMP Slurries" where table 1 and 2 show different oxidizing agent concentrations and their pHs are run with their respective CMP rate and etch rate. Therefore, it would have been obvious at the time of the invention for one skill in the art to determine the optimum polishing parameters including ammonium cerium nitrate concentration in the slurry through test runs as shown by Farkas to polish the metal with a reasonable expectation of success.

Using corrosion inhibitor (suggested by Farkas in col. 3, line 24), such as BTA, is well known to one skill in the art. Grumbine shows using corrosion inhibitor including BTA in table 1 and col. 5, line 27-30. Even though he doesn't describe the corrosion inhibitor concentration is in molar. His suggested concentration of 0.001-2.0 wt% would overlapped claimed 0.002-0.005 molar. The concentration of corrosion inhibitor would have been obvious to one skill in the art to determined through test runs, just like other process parameters including oxidizing agent concentration and pH determined through test runs shown by Farkas above, in order to achieve an optimum concentration that polish metal with an anticipation of an expected result.

Referring to claims 3 and 4, the slurry also contains 3 wt% of abrasive of alumina. Silica-based slurry is also conventional and known to one skill in the art for polishing metal (pg 25-31).

Art Unit: 1765

Referring to claim 7, since the above slurry comprising the same component as that of the claimed invention, it would be also environmentally green.

Referring to claim 29, using DI water would have been obvious and well known to one skilled in the to prepare any solution including the slurry since DI water is free of any contamination.

3. Skrovan et al. (US 5,916,819) in col. 5, line 20-25; Beyer et al. (US 4,944,836) in col. 5, line 25-55: shows that it is well known to polish metal with an acidic solution, such as a pH <4 and dielectric layer with a basic solution, a pH >7.

Claim Objections

4. Claims 8 and 9 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claims 8 and 9 do not further limit claim 1 since claims 8 and 9 repeat the limitation of claim 1, slurry containing glycine.

Response to Arguments

5. Applicant's arguments filed 6/3/02 have been fully considered but they are not persuasive.

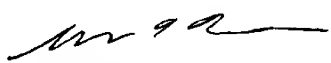
Applicant's argument that there is no motivation for combining the references because Farkas (patent) is focused on a slurry, which "does not contain metallic species" or "mobile ions", whereas the present application is directed toward a "Ceric-Ion Slurry" is found unpersuasive because it doesn't address to other references but to a reference, Farkas, and present application. The rejection doesn't combining Farkas and present application.

Art Unit: 1765

Applicant's argument that Brusie teaches away from using glycine because it creates a very high, uncontrollable removal rates observed during polishing is found not persuasive. As shown in Brusie, this affect is not created from the glycine itself but from the reaction of water soluble Cu-glycine complex with peroxide. The combined method doesn't describe using peroxide. Therefore, one skill in the art would use glycine because Brusie teaches that it increases the dissolution rate of Cu metal in the slurry.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 703-305-0515.

DVD
October 10, 2002


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